

# Process Performance Measurement for E-Government: A Case Scenario from the German Ministerial Administration

Christian SEEL

Institute for Information Systems (IW<sub>i</sub>) at the German Research Center for Artificial Intelligence (DFKI),  
Saarland University, Stuhlsatzenhausweg 3, Building D32, 66123 Saarbruecken (Germany)

and

Oliver THOMAS

Institute for Information Systems (IW<sub>i</sub>) at the German Research Center for Artificial Intelligence (DFKI),  
Saarland University, Stuhlsatzenhausweg 3, Building D32, 66123 Saarbruecken (Germany)

## ABSTRACT

During the past years, the realization of e-government-driven benefits was at the center of attention at various public administrations. The paper presented here outlines a process-driven approach for the evaluation of technology-driven performance impacts based on reference measures. From the German perspective, existing concepts of performance evaluation were concretized for the case scenario of German plan approval procedures.

**Keywords:** E-Government Rentability, Performance Measurement, Performance Indicators and Ratios, Reference Processes.

## 1. INTRODUCTION

Public administrations (PAs) are under increasing pressure to be more efficient, cost-effective and transparent. To face these challenges, first reform attempts have been made since the late 1960ies, but did not have the anticipated effect [6]. In the 1980ies the New Public Management (NPM) [1; 5; 15; 26] initiated a reform process that continues even today and is introduced worldwide in PAs. It comprises administrative reform strategies led by an economical interpretation of administrative processes. The core elements contain the setup of a decentralized management and organizational structure, the control of output, as well as competition and customer orientation.

With the electronic government or e-government, PAs all over the world are forcing the usage of modern information and communication technology (ICT). To realize its potentials, the highest objective consists in achieving the transaction-oriented and seamless integration of all parties involved. On the one hand, the concepts from the NPM represent a valuable enabler for the successful implementation of technical solutions and their usage [19, p.83], while on the other, the NPM's basic principle of target-oriented management offers concepts and principles for controlling the efficiency and effectiveness impact of e-government solutions.

Reference models are a well-proven and widely accepted instrument for merging technological and organizational aspects [8; 20; 23]. In general, they help PAs revise their

process structures, support change management and enable technical customizing and implementation. In addition, adequate performance indicators can be integrated into the model. Thus, the controlling of the e-government processes' efficiency according to the PA's aimed strategic goals becomes easier. Moreover, reference indicator-based benchmarking among various PAs is also facilitated, a mutual learning process is initiated and the evaluation of further optimization potentials is supported.

This paper outlines an approach for the set-up of performance indicators as an integrated part of reference models. In the first section, various approaches for performance management, as well as basic aspects of Process Performance Measurement (PPM) within PAs are described. Then, a case scenario from the German ministerial administration demonstrates the concrete set-up of a reference model-based PPM.

## 2. PROCESS PERFORMANCE MEASUREMENT

### Framework for administrative process management

The management of e-government processes requires a methodological framework as defined by the ARIS – House of Business Process Management [3] shown in Fig. 1. Although the concept was primarily developed for the business sector, its basic logic is of common validity and fits the domain of the PA [9].

Level one – the strategy level – forms the basis for process-related activities. Aspects such as the identification of e-government relevant processes, the corresponding process architecture or necessary applications are defined here. The overall administrative mission and strategy set the borders for the definition of the process related aspects.

On level two – the design and optimization level – the concrete appearance of the e-government processes is fixed according to the preferences defined at level one. Existing structures must be analyzed and – if necessary – revised. New processes for areas nonexistent in the past are defined according to optimization principles. In this context, the usage of reference models enables the consideration of the best practices and leads to time and cost advantages in designing process structures.

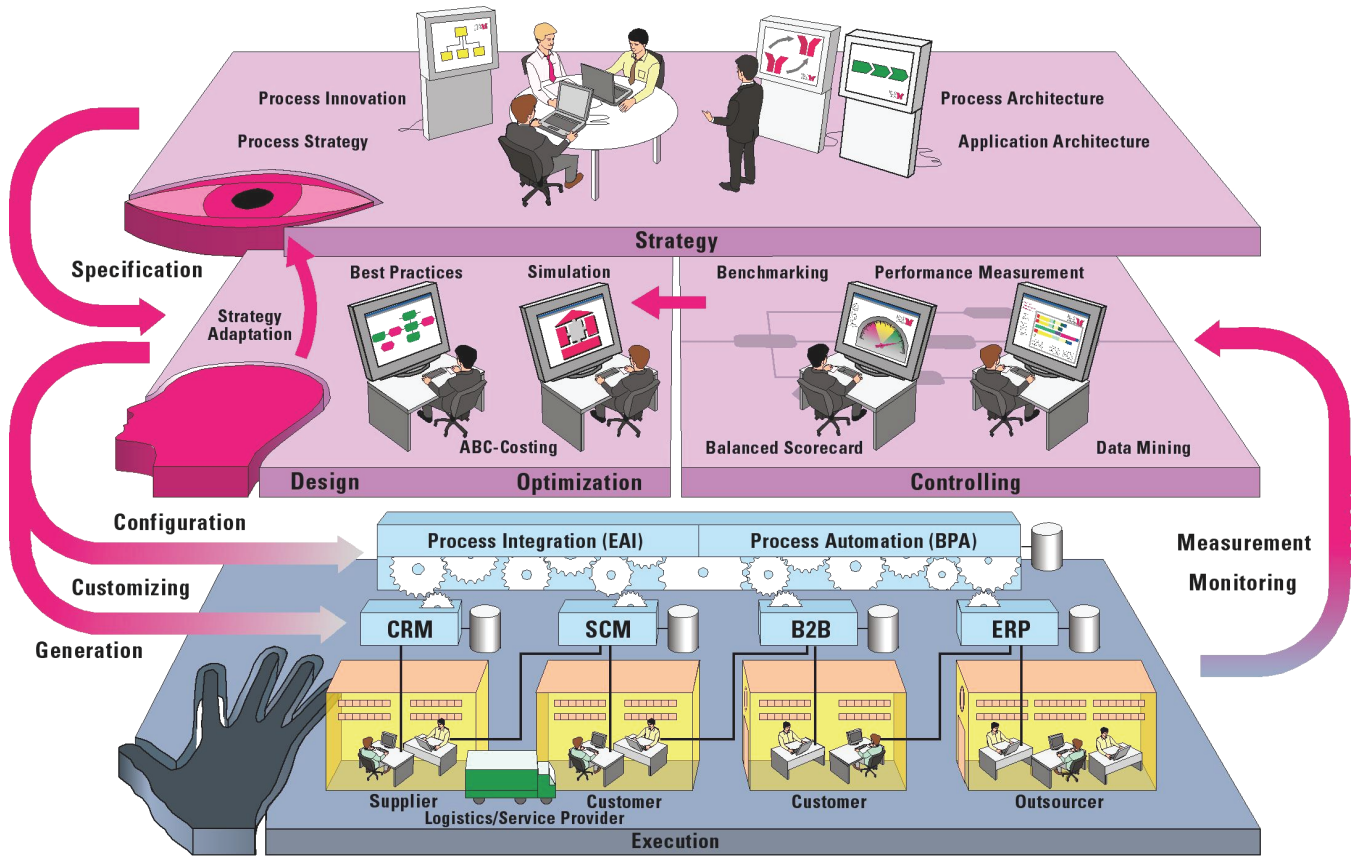


Fig. 1: HOBE – House of Business Process Management [3, p. 38]

The realization of the processes by selecting and using adequate technological concepts such as Enterprise Resource Planning (ERP), workflow or document management systems is part of the execution level. During their daily operation, the systems deliver a variety of data indicating the actual performance of the supported process structures. This performance information is transferred to the controlling level, which assures the analysis of the as-is performance. Here, the usage of reference models, which provide a set of performance indicators and basic principles for the measurement's realization, is of crucial interest. Feedback to the optimization level is made for the case that the as-is performance misses the goals incorporating the strategic aspects.

The ongoing comparison of the actual performance indicator's value with their performance goals allows a systematic and planned revision of the processes. This feedback mechanism supports continuous process management based on exact and valid data. At the same time, the process performance shows the impact of the e-government solutions and their effectiveness. Thus, the evaluation of cost and efficiency-related measures, such as the average cycle time, the calculation of resulting cost/revenue structures and their comparison to the Return on Investment (RoI)-related target values support the monitoring of the e-government solution's efficiency.

The aspects of the PPM as outlined above show the basic principle of comparing as-is measures to target values in order to define the degree of goal fulfillment. Beginning with the aspects set on the first level of HOBE, the strategic goals must

be "translated" into concrete measures and targets for operative process monitoring. Additionally, a well-defined organizational and reporting structure illustrates those responsible and their assigned duties, as well as the operational definition of the metrics and the measurement proceeding. Fig. 2 outlines an example for roles and responsibilities.

Reference models can support the initiation of a PPM by providing various sets of performance indicators and operational definitions for the measurement. According to the basic idea of reference modeling – the creation and application of common-type models valid for a class of application scenarios [23] – the model's user selects the measures and uses them as a basis for "customizing" according to the framework conditions of "his" administrative unit. Because of the actual lack of adequate reference models, which cover the requirements of e-government [12; 17; 24], integrated systems of reference processes, metrics and measurement procedures are missing. Additionally, the fields of NPM and e-government are often strictly separated in the administrative practice without using the complementary potentials. Nevertheless, the design of best practice measurement scenarios, their link to the identified e-government processes, as well as concepts for the ongoing, system-based measurement are of crucial importance for controlling e-government success. Various concepts are already available in the area of the NPM for supporting the development of measurement approaches as part of reference models for e-government. Focusing on the strategy and controlling levels, the following sections outline the development of measurement scenarios.

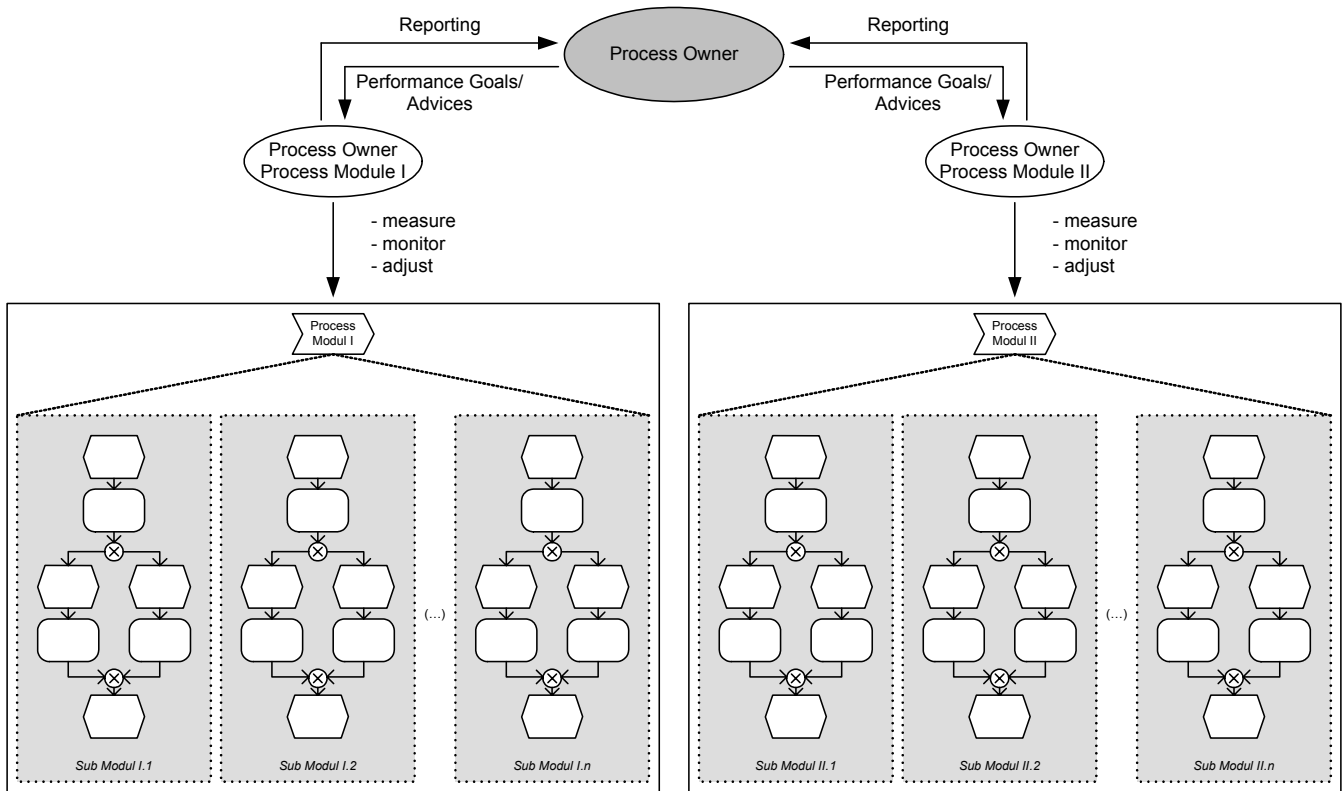


Fig. 2: Process Performance Measurement – Roles and Responsibilities

### Performance Measurement – Strategy Level

As mentioned above, the first step on the strategy level is the identification of relevant e-government processes, as well as the definition of corresponding process architecture. The latter aspect is realized in a top-down approach that systematically specifies the various relevant procedures from a high to a detailed level. The relevant strategic specifications are deduced from the e-government strategy, which should contain the ranking of administrative outputs according to their e-government impact. Considering the services' specific target groups, the main success factors, such as cycle times or cost efficiency can be evaluated as a basis for the definition of target values indicating the performance of the e-government processes.

Additionally, the balanced scorecard (BSC) [14] concept supports the systematic linkage of e-government strategy, process strategy and strategic targets. The concept was originally developed for the business area and contained the financial, the customer, the business process and the learning perspective. The perspectives are connected through cause and effect relationships showing the ability to realize the strategy and monitor these relationships. Today, the benefits of this strategic management tool are widely accepted within the sphere of PAs. Various examples demonstrate its successful usage, such as for example, in US city administrations [13], the Austrian federal government [11] or various federal ministries in Germany [21].

In the context of e-government, the BSC concept helps to operationalize the administration's e-government strategy. In a first step, the high-level strategic goals are extracted or formulated and assigned to the perspectives worked out in

advance (e.g. the financial, process, technical and recipient's perspectives). The verification of the interdependencies between the targets enables the proof of the strategy's completeness.

Subsequently, a set of performance indicators, which cover the various perspectives is developed for each strategic goal in a top-down approach. Referring to the HOBE, these activities are located on the controlling level. The following section describes some well-proven approaches that facilitate the development of measurement scenarios.

### Performance Measurement – Controlling Level

On the controlling level, the process-oriented measurement scenario is developed and implemented. Initially, the definition of performance indicators and corresponding measurement principles is focused, which enables the evaluation of process efficiency and shows the fulfillment of the strategic goals. As mentioned above, the process output is the object to consider for the process performance's evaluation. Accordingly, the performance indicators represent so-called "output measures". Their target values are based on – internal or external – requirements. The comparison to the as-is values shows the overall process quality and performance.

Possible measures are collected in a first step with regard to the strategic objectives for the development of measurement scenarios. The most appropriate ones are selected according to their potential for indicating the performance and impacts of process adjustments. Thus, it is crucial to focus on the "key" indicators, concentrating on relevant and easy collectible data [18]. Operational definitions, such as the description of the

measure's characteristics, the availability and source of data, the measurement period or the responsibilities, are defined in the second step. Finally, the target values for each indicator are concretized e.g. on the basis of as-is values [11]. The ongoing comparison to these performance goals enables the evaluation of the process performance. Additionally, the as-is performance before implementing an e-government solution can be used as a so-called "baseline". The gap between this baseline and the as-is performance values after the implementation of the e-government shows the improvement or lack of efficiency and also enables the evaluation of the (financial) benefits.

The comparison of the as-is to target values corresponds to the concept of benchmarking, which represents a well-proven management tool. The general intention is the analysis and improvement of organizational performance and the ability to execute. Based on performance indicators, a comparison with "best in class" results enables the evaluation of improvement potential. Various forms of benchmarking exist. The most relevant are [7; 27]:

- 1) Internal benchmarking: focuses on the comparison of intra-organizational objects.
- 2) External benchmarking: focuses on the comparison between different organizations.
- 3) Best Practice benchmarking: focuses on the comparison with acknowledged standards.

The development of performance indicators and the corresponding measurement specifics for benchmarking at the PAs is the subject of a variety of approaches. They provide "ready to use" measurement scenarios and are capable of supporting the evaluation of relevant indicators. From the German perspective, the project "kik", realized by the Bertelsmann Foundation, is an example of a concept that provides measures for the internal performance evaluation at the municipal level. Basically, kik defines four target dimensions:

- 1) The quality of execution,
- 2) Customer satisfaction,
- 3) Workforce satisfaction and
- 4) Economic efficiency.

For each category, sets of performance indicators that enable the administrative performance's measurement are available. The as-is values are compared to internal targets or to the performance values of other administrations [22].

The performance indicators provided by the German "IKO Net", initiated and coordinated by the KGSt, a public consulting agency for municipal administrations, represent another widely accepted approach. More than 1,600 municipal administrations are members in the IKO-network and compare their performance in selected areas on a regular basis. The KGSt serves as a "catalyst" and provides a total of 56 sets of performance indicators and the corresponding operational definitions for 35 fields of administrative activities, such as human resource or waste management. The participating municipalities' measurement results are stored in a central database, which is maintained by the KGSt and serves inter-organizational performance comparisons [2]. Because of its extent and usability, this concept was chosen as the inspiration for the design of performance indicators as part of the reference model shown in section 3.

Additionally, concepts of quality management help to structure measurement scenarios and support the definition of adequate metrics. The Common Assessment Framework (CAF) shown in Fig. 3 provides nine dimensions and corresponding sets of criteria, which enable the self-assessment and the evaluation of strengths and improvement potentials for PAs.

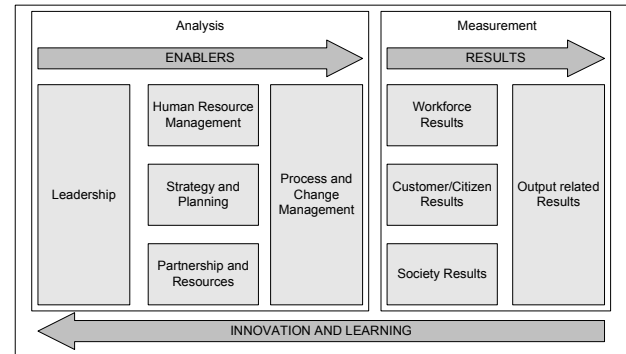


Fig. 3: Common Assessment Framework (CAF) [4]

The CAF was initiated by the ministers of the EU in 2000 and builds on the model of the European Foundation for Quality Management (EFQM) and the performance ratios of the Speyer Quality contest. The nine rating categories, assigned to the categories of "enablers" and "results", focus on aspects of organizational development and contain criteria for performance ratings. The evaluation of the results leads to the rating of the as-is performance; the analysis of the enablers shows the causes for the actual performance level. The criteria used for the evaluation of the actual performance per category are illustrated within the CAF as questions and come along with rating scales. During the self-assessment, those responsible must answer these questions by using the scales provided [4]. As a consequence, the measurement of performance aspects, based on the indicators of the IKO Net, facilitate this process.

The second part of activities at the controlling level is the ongoing measurement and analysis of process performance according to the specified metrics and measurement principles. The data collection can be realized in different ways depending on the PA's individual requirements. Accordingly, for example a manual data collection via questionnaires or scoring lists can be carried out supported by an Excel-based analysis. To utilize automation potentials by excerpting relevant data from the executive systems according to the basic idea of HOBE, the usage of professional performance management tools is crucial. Fig. 4 shows the measurement and display of process costs using the ARIS Process Performance Manager (ARIS-PPM) (<http://www.ids-scheer.com/>).

The following section demonstrates the development of ratios aiming at the evaluation of process performance for the case scenario "Plan Approval Procedure (PAP)" within the traffic sector [16, p.1754]. The basic idea of the corresponding research project "RAFEG – reference architecture for E-Government" [25] consists in the development of a comprehensive reference process model, as well as the development of technical components for the process execution. The reference model will – in addition to the reference process structures – provide typical performance indicators and measurement concepts supported by the data delivered by the technical components.

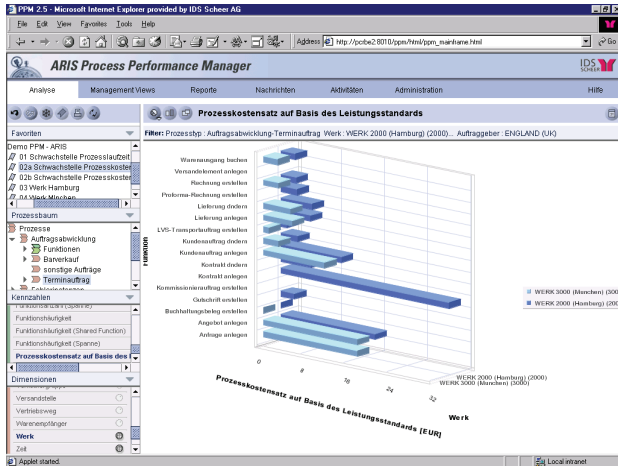


Fig. 4: Process Performance Management with the ARIS-PPM

### 3. CASE SCENARIO

Because of the lack of adequate reference models covering the requirements of e-government, the first step of the RAFEG project was to develop a model for the case scenario “Plan Approval Procedures”. PAPs are required for all public construction efforts, such as streets, airports or railways, and legitimate the building project as far as public interests are concerned. The official approval of a plan however, also defines the area in which construction must be realized [10, p. 39]. As part of an integrated architecture, the reference model will support the organizational analysis and customizing of the system components.

In order to construct the reference model for PAPs, three main steps were realized (a detailed overview on the proceeding for the development of the reference model can be found in [24]). First, an analysis of the legal framework was made to get an overview on the specific regulations affecting the processes. Based on this, the development of an initial, component-based process scenario was realized, which then served as a basis for the as-is evaluation of the “real life” procedures at various administrations on the German federal state level. The additional information won here was integrated into the models in order to complete them.

Fig. 5 gives an overview on the reference process module “gather statements”. It serves as an example for the development of the measurement scenario. Statements are gathered after the preceding module “check planning documents”, which generates the complete planning documents as output, is put into action. Here, nature conservation organizations and public agencies are invited to give their statements. They receive the planning documents that provide the basis for their feedback. At the same time, the plan approval agency collects the incoming statements. The collection and documentation of these declarations represent one of the module’s outputs and serves as input for the following module “handle objections and statements”.

For the identification of performance indicators and measures, the monitoring of the process quality, the process costs and the cycle time were named as the partner administration’s target dimensions. In order to operationalize them for the whole process, the CAF result dimensions and their accompanying

criteria provided an initial starting point. The usage of the European concept covers the requirement of common validity for the reference model-related performance indicators. Because of the project’s time restrictions, the responsables rejected the development of a BSC.

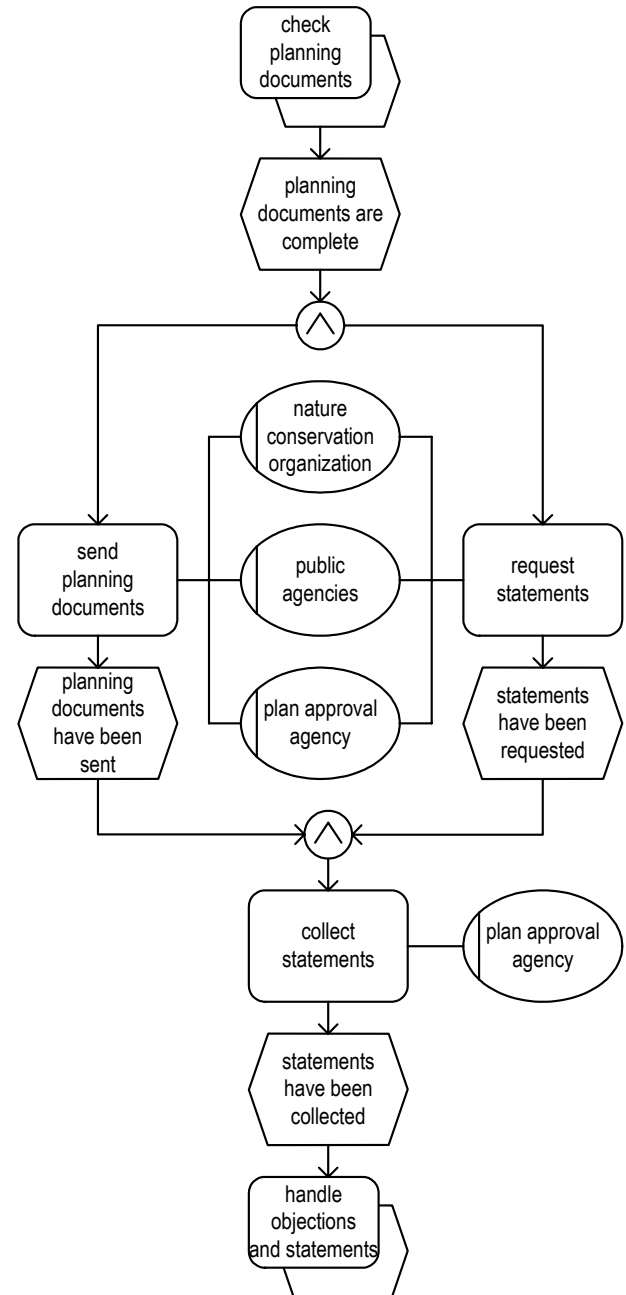


Fig. 5: Reference process module “Gather statements”

Subsequently, the evaluation criteria were operationalized for the various process modules in order to enable the concrete measurement and performance evaluation. The performance indicators from the IKO Net covering the areas of “environmental conservation” and “construction planning” provided precious input here. Table 1 shows the measures and their operational definitions. According to the principle of output orientation, the indicators are tied to the process module’s results. The displayed output measures characterize the process output “sent planning documents”.

Process Module	Output	Performanceindicator	Explication	Unit	Measurement description		
					Measurement tool („how“?)	Measurement frequency („when“?)	Responsible („who“?)
	Output 3.2 Sent Planning Documents	3.2.1 Total of sendouts	Number of planning documents sent to the recipients	pcs.	Checksheet; system based	Per PAP, monthly	Dept. 4.1
		3.2.2 Number of defective units	Number of documents that contain a defect: - formal defects as e.g. missing recipients - content related defects as e.g. missing documents	pcs.	Checksheet	Per PAP, monthly	Dept. 4.1
		3.2.3 Average cycle time	Period between the reception of the planning documents and their sendout compared to the total of sendouts	dys.	System based	Per PAP, monthly	Dept. 4.1
		3.2.4 Number of corrections	Number of process cycles (re-work) that have to be performed to eliminate defects	pcs.	Checksheet; system based	Per PAP, monthly	Dept. 4.1
		3.2.5 Average correction time	Period between the approval of a defect and its elimination compared to the number of defective units	dys./ unit	System based	Every 6 months; compared to all PAP	PAA
		3.2.6 Percentage of rework related costs	Process costs for reworks including staff and other resource cost compared to the total costs	%	System based	Every 6 months; compared to all PAP	PAA
		3.2.7 Total process costs per unit	Costs per sent document	€	System based	Per PAP	Dept. 4.1
		3.2.8 Percentage of efforts	Plan approval agency's efforts caused by the sendout compared to the total efforts	%	System based	Every 6 months; compared to all PAP	PAA

Table 1: Output measures reference process module “Gather statements”

Beyond the one shown, a set of performance indicators and measurement specifications was developed for each of the five reference process modules. The link to the relevant CAF result dimension and evaluation criteria ensured the completeness of the measurement scenarios. Experience has shown that the consideration of process structures on a high aggregated level is sufficient and ensures the concentration on crucial indicators. With respect to the reporting and process owner structure shown in Fig. 2, the definition of measurement scenarios per process module ensures the ability of the sub-process owners to monitor “their” process modules. The aggregation of the collected data leads to the performance evaluation of the overall process “Plan Approval Procedures”. Those responsible within various PAs can select and customize the measurement specifics simultaneously to the model’s adaptation based on the specifics defined within the reference measurement scenario. The set up of a process performance measurement is facilitated and time and cost advantages are realized.

#### 4. SUMMARY AND OUTLOOK

This paper outlined the development of reference model-based performance indicators and measurement scenarios, which enable the implementation of a Process Performance Measurement. Based on approaches developed in the field of the NPM, the measures and their operational definitions have been illustrated and linked to the reference process modules, which cover the case scenario German plan approval procedures. At present, the definition of performance goals for partner administrations is in the focus of project work. First as-is measurements are realized in order to get a baseline for actual process performance and find realistic target values

considering the requirements of the stakeholders involved. By using check sheets the data already available, such as total cycle times is collected and new data, such as the number of defective outputs, is evaluated. In a later phase, the prototypically developed system components for the execution of the PAP will be implemented and provide the data needed. At this stage, the implementation of the indicators in a professional tool for process performance management, which provides interfaces to the prototype is intended. The comparison to the actual baseline shows the impacts of the ICT-usage and displays the benefits of the e-government approach within the field of plan approval procedures.

#### 5. REFERENCES

- [1] Minogue, M. (ed.): **Beyond the new public management** : changing ideas and practices in governance ; [chiefly papers presented at Public management for the next century: an international conference to review trends and public management and governance, held June – July 1997, University of Manchester]. Cheltenham : Elgar, 1998
- [2] KGSt (ed.): **Arbeit mit Kennzahlen** ; Teil 1: Grundlagen. Köln, 2001. – in German
- [3] Scheer, A.-W.; Abolhassan, F.; Jost, W.; Kirchmer, M. (eds.): **Business Process Excellence** : ARIS in Practice. Berlin : Springer, 2002
- [4] Deutsches CAF-Zentrum (ed.): **Common Assessment Framework (CAF)** : ein gemeinsames Europäisches Qualitätsbewertungssystem ; Verbesserung der Organisation durch Selbstbewertung. Berlin : Bundesministerium des Innern, 2003. – in German

- [5] Anessi-Pessina, E.; Steccolini, I.: Evolutions and limits of new public management. **Public Budgeting & Finance** 25 (2005), No. 2, pp. 1–14
- [6] Beyer, L.; Brinckmann, H.: **Kommunalverwaltung im Umbruch** : Verwaltungsreform im Interesse von Bürgern und Beschäftigten. Cologne : Bund-Verl., 1990 (Zukunft durch öffentliche Dienste). – in German
- [7] Camp, R. C.: **Benchmarking**. Munich : Hanser, 1994
- [8] Fettke, P.; Loos, P.: Classification of Reference Models – A Methodology and its Application. **Information Systems and e-Business Management** 1 (2003), No. 1, pp. 35–53
- [9] Heib, R.: Effiziente Verwaltungsprozesse durch E-Government. In: Scheer, A.-W.; Albohassan, F.; Kruppke, H.; Jost, W. (eds.): **Innovation durch Geschäftsprozessmanagement** : Jahrbuch Business Process Excellence 2004/2005. Berlin : Springer, 2004, pp. 385–398. – in German
- [10] Hoppe, W.; Schlarmann, H.; Buchner, R.: **Rechtsschutz bei der Planung von Straßen und anderen Verkehrsanlagen**. 3<sup>rd</sup> ed. Munich : Beck, 2001 (Schriftenreihe der Neuen juristischen Wochenschrift; 8). – in German
- [11] Horak, C.; Schwarenthorer, F.; Furtmüller, S.: **Die Balanced Scorecard in der öffentlichen Verwaltung** : Vorgehensweise bei der Einführung unter Berücksichtigung der Besonderheiten in der öffentlichen Verwaltung. Wien : Contrast Management Consulting, 2002. – in German
- [12] Horn, E.; Off, T.: **eGovernment-Architekturen auf Basis der eLoGo-Referenzmodelle**. Potsdam : Univ.-Verl., 2004 (KWI-Projektberichte ; 9). – in German
- [13] Kaplan, R. S.: City of Charlotte (A). Cambridge, MA : Harvard Business School Press, 1998 (**Harvard Business School Case** ; 9–199–036)
- [14] Kaplan, R. S.; Norton, D. P.: **The balanced scorecard** : translating strategy into action. Boston, MA : Harvard Business School Press, 1996
- [15] Lane, J.-E.: **New public management**. London : Routledge, 2000
- [16] Laubinger, H.-W.: Verwaltungsverfahren. In: Chmielewicz, K.; Eichhorn, P. (eds.): **Handwörterbuch der Öffentlichen Betriebswirtschaft**. Stuttgart : Poeschel, 1989 (Enzyklopädie der Betriebswirtschaftslehre; 11), pp. 1753–1760. – in German
- [17] Lenk, K.: Prozessmodelle für eGovernment. In: Kubicek, H.; Klumpp, D.; Büllsbach, A. (eds.): **Innovation@Infrastruktur** : Informations- und Dienstleistungsstrukturen der Zukunft. Heidelberg : Hüthig, 2002 (Jahrbuch Telekommunikation und Gesellschaft), pp. 199–205. – in German
- [18] Rienaß, U.: Die wirkungsorientierte Steuerung im Landeseinwohneramt Berlin – Kennzahlen und Leistungsvergleiche. In: Kuhlmann, S.; Bogumil, J.; Wollmann, H. (eds.): **Leistungsmessung und -vergleich in Politik und Verwaltung** : Konzepte und Praxis. Wiesbaden : VS Verl. für Sozialwissenschaften, 2004 (Stadtforchung aktuell), pp. 186–203. – in German
- [19] Schedler, K.; Proeller, I.: **New public management**. 2<sup>nd</sup> ed. Bern : Haupt, 2003
- [20] Scheer, A.-W.: **Business Process Engineering** : Reference Models for Industrial Enterprises. 2<sup>nd</sup> ed. Berlin : Springer, 1994
- [21] Scherer, A. G.; Alt, J. M.: **Strategische Steuerung und Balanced Scorecard**. Berlin : Bundesverwaltungsamt, 2002. – INFO 1694 Juli 2002. – in German
- [22] Tebbe, G.: Arbeiten mit Kennzahlen: Anwendungserfahrungen aus den Projekten kik und Kompass der Bertelsmann Stiftung. In: Kuhlmann, S.; Bogumil, J.; Wollmann, H. (eds.): **Leistungsmessung und -vergleich in Politik und Verwaltung** : Konzepte und Praxis. Wiesbaden : VS Verl. für Sozialwissenschaften, 2004 (Stadtforchung aktuell), pp. 138–147. – in German
- [23] Thomas, O.: Understanding the Term Reference Model in Information Systems Research: History, Literature Analysis and Explanation. In: Bussler, C.; Haller, A. (eds.): **Business Process Management Workshops** : BPM 2005 International Workshops, BPI, BPD, ENEL, BPRM, WSCOBPM, BPS, Nancy, France, September 5, 2005 ; Revised Selected Papers. Berlin : Springer, 2006 (Lecture Notes in Computer Science; 3812), pp. 484–496
- [24] Thomas, O.; Seel, C.; Seel, C.; Kaffai, B.; Martin, G.: EPK-Referenzmodelle für Verwaltungsverfahren. In: Nüttgens, M.; Rump, F. J. (eds.): **EPK 2004 : Geschäftsprozessmanagement mit Ereignisgesteuerten Prozessketten** ; 3. Workshop der Gesellschaft für Informatik e.V. (GI) und Treffen ihres Arbeitskreises "Geschäftsprozessmanagement mit Ereignisgesteuerten Prozessketten (WI-EPK)", 06. Oktober 2004 in Luxemburg. Bonn : GI, 2004, pp. 39–54. – in German
- [25] Thomas, O.; Seel, C.; Seel, C.; Kaffai, B.; Martin, G.: Referenzarchitektur für E-Government (RAFEG): Konstruktion von Verwaltungsverfahrenmodellen am Beispiel der Planfeststellung. In: Scheer, A.-W. (ed.): **Veröffentlichungen des Instituts für Wirtschaftsinformatik**, No. 179, Saarbrücken : Universität des Saarlandes, 2004. – in German
- [26] Thompson, F.; Jones, L. R.: **Reinventing the Pentagon** : how the new public management can bring institutional renewal. San Francisco, CA : Jossey-Bass, 1994
- [27] Ulrich, P.: **Organisationales Lernen durch Benchmarking**. Wiesbaden : Dt. Univ.-Verl., 1998 (Gabler-Edition Wissenschaft; Markt- und Unternehmensentwicklung). – in German